device is made adjustable. Since the position of the illumination area by the illumination light that illuminates the modulating means is fine-adjusted, the illumination area is positioned such that it always includes the image forming device of the modulating device within.

The above arrangement makes it unnecessary to set a large margin around the image forming area to cover the offset of the illumination area from the image forming area of the modulating device. The utilization of the illumination light is thus enhanced and the brightness of the projected image is heightened. Since the illumination area by the illumination light is positioned such that it includes the image forming area, no shadow is generated around the projected image.

Since the mounting position is fine-adjusted of the superimposing device, which is an optical component chiefly determining the illumination area of the modulating device, the adjustment of the position of the illumination area is thus performed taking into consideration the mounting errors of optical components (optical elements) in front of the superimposing device (upstream of the superimposing means). The position of the illumination area of the modulating device is easily and efficiently adjusted.

While the invention has been described in relation to preferred embodiments, many modifications and variations are intended to be within the scope of the present invention as defined in the append claims.

What is claimed is:

1. A [projection-type display apparatus] projector comprising:
- a light source that emits a light beam;
- a modulator having an image forming area, the modulator receives the light beam emitted by the light source and outputs a modulated light beam;
- a projection lens that projects the light beam modulated by the modulator;
- an optical element, disposed in an optical path between the light source and the modulator, the optical element splits the light beam into a plurality of intermediate light beams; and
- a superimposor capable of being adjusted to different mounting positions that superimposes each of the intermediate light beams onto the image forming area of the modulator.

2. The [projection-type display apparatus] projector of claim 1, further comprising a reflector capable of being adjusted to different mounting angles with respect to an incident optical axis and being provided in the optical path between the light source and the modulator.

3. The [projection-type display apparatus] projector of claim 1, further comprising:
- a color separating optical system provided between the superimposor and the modulator to separate light output from the superimposor into color light beams;
- a plurality of modulators connected with the color separating optical system to produce modulated color light beams;
- a color synthesizing optical system that receives the modulated color light beams and outputs enlarged synthesized color light beams which are projected by the projection lens; and
- a reflector disposed in an optical path between the color separating optical system and at least one of the plurality of modulators and having an adjustable mounting angle with respect to an incident optical axis.

4. The [projection-type display apparatus] projector of claim 3, wherein a mounting angle of the reflector located closest to the modulator is adjustable.

5. The [projection-type display apparatus] projector of claim 3, wherein the modulator is a reflection type modulator.

6. A [projection-type display apparatus] projector comprising:
- a light source that outputs a light beam;
- a first optical element that splits the light beam output from the light source into a plurality of intermediate light beams;
- a second optical element including a polarization conversion unit that outputs polarized light beams and a superimposor that superimposes light beams output from the polarization conversion unit, the superimposor having an adjustable mounting position, the second optical element arranged in a vicinity of a position where the intermediate light beams are converged, the second optical element separates the intermediate light beams from the first optical element into a p-polarized light beam and an s-polarized light beam, the second optical element aligns a polarization direction of one of the p-polarized light beam and the s-polarized light beam [with a polarization direction of the other of the p-polarized light beam and the s-polarized light beam], and the second optical element outputs the resulting light beams;
- a modulator that receives and modulates the light beams emitted from the second optical element; and
- a projection lens that projects the light beam modulated by the modulator.

7. The [projection-type display apparatus] projector of claim 6, further comprising a reflector provided in an optical path between the light source and the modulator, the reflector having an adjustable mounting angle with respect to an incident optical axis.

8. The [projection-type display apparatus] projector of claim 6, further comprising:
- a color separating optical system provided between the superimposor and the modulator to separate light output from the superimposor into color light beams;
- a plurality of modulators connected with the color separating optical system to produce modulated light beams;
- a color synthesizing optical system that receives the modulated color light beams and outputs enlarged synthesized color light beams which are projected by the projection lens; and
- a reflector disposed in an optical path between the color separating optical system and at least one of the plurality of modulators and having adjustable mounting angle with respect to an incident optical axis.

9. The [projection-type display apparatus] projector of claim 8, wherein a mounting angle of the reflector located closest to the modulator is adjustable.

10. The [projection-type display apparatus] projector of claim 8, wherein the modulator is a reflection type modulator.

11. A [projection-type display apparatus] projector comprising:
a light source that emits a light beam;
a modulator having an image forming area, the modulator modulates the light beam emitted by the light source;
a projection lens that projects the light beam modulated by the modulator [and a projector screen];
an optical element, located in an optical path between the light source and the modulator, the optical element splits the light beam emitted from the light source into a plurality of intermediate light beams;
a superimposor that superimposes each of the intermediate light beams from the optical element onto the image forming area of the modulator; and
an adjustment mechanism connected with the superimposor to adjust a mounting position of the superimposor.

12. The [projection-type display apparatus] projector of claim 11, further comprising:
a first adjustment mechanism connected with the superimposor to adjust the mounting position of the superimposor in a first direction orthogonal to an optical axis; and
a second adjustment mechanism connected with the superimposor to adjust the mounting position of the superimposor in a second direction orthogonal to the optical axis and the first direction.

13. The [projection-type display apparatus] projector of claim 12, wherein the adjustment mechanism comprises:
a base adjustment plate;
a first adjustment plate slidably movable in the first direction relative to the base adjustment plate; and
a second adjustment plate slidably movable in the second direction relative to the first adjustment plate.

14. The [projection-type display apparatus] projector of claim 13, wherein the adjustment mechanism comprises a first slip prevention mechanism that prevents the first adjusting plate from slipping in the second direction and a second slip prevention mechanism that prevents the second adjustment plate from slipping in the first direction.

15. The [projection-type display apparatus] projector of claim 13, wherein the superimposor is fixed to the second adjustment plate.

16. A [projection-type display apparatus] projector comprising:
a light source that outputs a light beam;
a first optical element that splits a light beam output from the light source into a plurality of intermediate light beams;
a second optical element including a polarization conversion unit that outputs polarized light beams and a superimposor that superimposes light beams output from the polarization conversion unit, the second optical element arranged in a vicinity of a position where the intermediate light beams are converged, the second optical element separates the intermediate light beams from the first optical element into a p-polarized light beam and an s-polarized light beam, the second optical element aligns a polarization direction of one of a p-polarized light beam and the s-polarized light beam [with a polarization direction of the other of the p-polarized light beam and the s-polarized light beam], and the second optical element outputs the resulting light beams;
a modulator that receives and modulates the light beams emitted from the second optical element;

a projection lens that projects the light beam modulated by the modulator; and
an adjusting mechanism that adjusts a mounting position of the superimposor.

17. The [projection-type display apparatus] projector of claim 16, further comprising:
a first adjustment mechanism that adjusts the mounting position of the superimposor in a first direction orthogonal to an optical axis; and
a second adjustment mechanism that adjusts the mounting position of the superimposor in a second direction orthogonal to the optical axis and the first direction.

18. The [projection-type display apparatus] projector of claim 17, wherein the adjustment mechanism comprises:
a base adjustment plate;
a first adjustment plate slidably movable in the first direction relative to the base adjustment plate; and
a second adjustment plate slidably movable in the second direction relative to the first adjustment plate.

19. The [projection-type display apparatus] projector of claim 18, wherein the adjustment mechanism comprises a first slip prevention mechanism that prevents the first adjustment plate from slipping in the second direction and a second slip prevention mechanism that prevents the second adjustment plate from slipping in the first direction.

20. A projector, comprising:
a light source that emits a light beam;
a modulator having an image forming area, the modulator receives the light beam emitted by the light source and outputs a modulated light beam;
a projection lens that projects the light beam modulated by the modulator;
an optical element, disposed in an optical path between the light source and the modulator, the optical element splits the light beam into a plurality of intermediate light beams;
a superimposer capable of being adjusted to different mounting positions that superimposes each of the intermediate light beams onto the image forming area of the modulator;
a power supply;
an input/output interface circuit;
a video signal processing circuit;
a control circuit that drives and controls the projector; and
an outer casing that accommodates the light source, the modulator, the optical element, superimposer, the power supply, the input/output interface circuit, the video signal processing circuit, and the control circuit.

21. The projector of claim 20, further comprising a reflector capable of being adjusted to different mounting angles with respect to an incident optical axis and being provided in the optical path between the light source and the modulator.

22. The projector of claim 20, further comprising:
a color separating optical system provided between the superimposor and the modulator to separate light output from the superimposor into color light beams;
a plurality of modulators connected with the color separating optical system to produce modulated color light beams;
a color synthesizing optical system that receives the modulated color light beams and outputs enlarged synthesized color light beams which are projected by the projection lens; and

a reflector disposed in an optical path between the color separating optical system and at least one of the plurality of modulators and having an adjustable mounting angle with respect to an incident optical axis.

23. The projector of claim 22, wherein a mounting angle of the reflector located closest to the modulator is adjustable.

24. The projector of claim 22, wherein the modulator is a reflection type modulator.

25. A projector, comprising:

a light source that outputs a light beam;

a first optical element that splits the light beam output from the light source into a plurality of intermediate light beams;

a second optical element including a polarization conversion unit and a superimposer that superimposes light beams output from the polarization conversion unit, the superimposer having an adjustable mounting position, the second optical element is arranged in a vicinity of a position where the intermediate light beams are converged, the second optical element separates the intermediate light beams from the first optical element into a p-polarized light beam and an s-polarized light beam, the second optical element aligns a polarization direction of one of the p-polarized light beam and the s-polarized light beam, and the second optical element outputs the resulting light beams;

a modulator that receives and modulates the light beam emitted from the second optical element;

a projection lens that projects the light beam modulated by the modulator;

a power supply;

an input/output interface circuit;

a video signal processing circuit;

a control circuit that drives and controls the projector; and

an outer casing that accommodates the light source, the first and second optical elements, the modulator, the power supply, the input/output interface circuit, the video signal processing circuit, and the control circuit.

26. The projector of claim 25, further comprising a reflector provided in an optical path between the light source and the modulator, the reflector having an adjustable mounting angle with respect to an incident optical axis.

27. The projector of claim 25, further comprising:

a color separating optical system provided between the superimposor and the modulator to separate light output from the superimposor into color light beams;

a plurality of modulators connected with the color separating optical system to produce modulated light beams;

a color synthesizing optical system that receives the modulated color light beams and outputs enlarged synthesized color light beams which are projected by the projection lens; and

a reflector disposed in an optical path between the color separating optical system and at least one of the plurality of modulators and having adjustable mounting angle with respect to an incident optical axis.

28. The projector of claim 27, wherein a mounting angle of the reflector located closest to the modulator is adjustable.

29. The projector of claim 27, wherein the modulator is a reflection type modulator.

30. A projector, comprising:

a light source that emits a light beam;

a modulator having an image forming area, the modulator modulates the light beam emitted by the light source;

a projection lens that projects the light beam modulated by the modulator;

an optical element, located in an optical path between the light source and the modulator, the optical element splits the light beam emitted from the light source into a plurality of intermediate light beams;

a superimposer that superimposes each of the intermediate light beams from the optical element onto the image forming area of the modulator;

an adjusting mechanism connected with the superimposer to adjust a mounting position of superimposer;

a power supply;

an input/output interface circuit;

a video signal processing circuit;

a control circuit that drives and controls the projector; and

an outer casing that accommodates the light source, the modulator, the optical element, the superimposer, the adjusting mechanism, the power supply, the input/output interface circuit, the video signal processing circuit, and the control circuit.

31. The projector of claim 30, further comprising:

a first adjustment mechanism connected with the superimposor to adjust the mounting position of the superimposor in a first direction orthogonal to an optical axis; and

a second adjustment mechanism connected with the superimposor to adjust the mounting position of the superimposor in a second direction orthogonal to the optical axis and the first direction.

32. The projector of claim 31, wherein the adjustment mechanism comprises:

a base adjustment plate;

a first adjustment plate slidably movable in the first direction relative to the base adjustment plate; and

a second adjustment plate slidably movable in the second direction relative to the first adjustment plate.

33. The projector of claim 32, wherein the adjustment mechanism comprises a first slip prevention mechanism that prevents the first adjusting plate from slipping in the second direction and a second slip prevention mechanism that prevents the second adjustment plate from slipping in the first direction.

34. The projector of claim 32, wherein the superimposor is fixed to the second adjustment plate.

35. A projector, comprising:

a light source that outputs a light beam;

a first optical element that splits the light beam output from the light source into a plurality of intermediate light beams;

a second optical element including a polarization conversion unit and a superimposer that superimposes light beams output from the polarization conversion unit, the second optical element is arranged in a vicinity of a position where the intermediate light beams are converged, the second optical element separates each of the intermediate light beams from the first optical element into a p-polarized light beam and an s-polarized light beam, the second optical element aligns a polarization direction of one of the p-polarized light beam and the s-polarized light beam, and the second optical element outputs the resulting light beams;

a modulator that receives and modulates the light beams emitted from the second optical element;

a projection lens that projects the light beam modulated by the modulator;

an adjusting mechanism that adjusts a mounting position of the superimposer;

a power supply;

an input/output interface circuit;

a video signal processing circuit;

a control circuit that drives and controls the projector; and

an outer casing that accommodates the light source, the first and second optical elements, the modulator, the adjusting mechanism, the power supply, the input/output interface circuit, the video signal processing circuit, and the control circuit.

36. The projector of claim 35, further comprising:

a first adjustment mechanism that adjusts the mounting position of the superimposor in a first direction orthogonal to an optical axis; and

a second adjustment mechanism that adjusts the mounting position of the superimposor in a second direction orthogonal to the optical axis and the first direction.

37. The projector of claim 36, wherein the adjustment mechanism comprises:

a base adjustment plate;

a first adjustment plate slidably movable in the first direction relative to the base adjustment plate; and

a second adjustment plate slidably movable in the second direction relative to the first adjustment plate.

38. The projector of claim 37, wherein the adjustment mechanism comprises a first slip prevention mechanism that prevents the first adjustment plate from slipping in the second direction and a second slip prevention mechanism that prevents the second adjustment plate from slipping in the first direction.

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